BOTANY.[1]

THE ROOTSTOCKS OF LEERSIA AND MUHLENBERGIA.[2] — *Leersia virginica* Willd., grows in wet, shady places, and starts rather late in the spring. Late in autumn the parts below ground are found to consist mainly of some slender exhausted and dead rootstocks, from one to three or four centimetres long. The internodes of these slender exhausted rootstocks are covered for a part of their length by sheaths of rudimentary leaves, early bearing a very short blade.

A portion, perhaps one-third, of the nodes bear from one to four thickened, scaly rootstocks, which contain nourishment for starting young plants the next spring. In some cases one or more scaly rootstocks appear near the apex of a similar rootstock which survived the winter.

The surviving rootstocks are slightly flattened, one to four centimetres long by three to five mm. in diameter, covered with scales, and are mostly simple, though some of them have short branches.

The scales are brown, alternating and two ranked, and on internodes which are from one to two mm. long. The bases of the scales are thickened and abound in plant food.

Leersia oryzoides Swartz, also has rootstocks, the main axis of which is not very unlike that of the former species, though in autumn they are rather stouter, and most of them remain alive and gorged with plant food for use on the approach of the succeeding spring. Many of the nodes bear short, pointed, solid branches, with four to eight nodes. The scales of these buds are mere dead rings or shreds, and are not filled with nourishment in autumn.

The fundamental differences, then, between the rootstocks of these two species are as follows:

1. In winter the main rootstocks of *Leersia virginica* are dead, while those of *L. oryzoides* are alive and abound in food.

2. The scales of the rootstocks coming from the nodes of the main rootstocks of *L. virginica* are broad, firm, and full of plant food, while the corresponding scales of the branches of *L. oryzoides* are reduced to mere dead fragments, containing no plant food. No good specimens of other species of *Leersia* were examined in reference to their rootstocks.

A considerable portion, if not all, the species of *Muhlenbergia* put forth flowering branches. In case of *M. debilis* Trin., some of the lower internodes from the surface to five or more centimetres above frequently branch at the nodes, where there are clusters of

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[2] Read before the Botanical Club of the A. A. A. S., in New York, Aug., 1887.

bracts or short leaves. The specimens of this species examined were quite erect, not geniculate, nor rooting at the nodes.

The culms of *M. diffusa* Schreb., *M. neomexicana* Vasey, are much like those of the former species, only they are geniculate, and root freely at the nodes.

From those which are geniculate and rooting at the nodes, it is only a step to those which bear rootstocks on or below the surface of the ground.

M. comata Benth., produces branching rootstocks about five mm. long by one mm. in diameter. These are covered with thin bracts rather loosely appressed, and from one to two mm. long. They represent the sheaths of leaves only.

M. glomerata Trim., has rootstocks much like those of *M. comata*, only the internodes are a little shorter and the appressed scales more abruptly pointed. *M. willdenovii* Trin., has rootstocks which are rather larger, with internodes still shorter ($1\frac{1}{2}$ mm.), the scales broad, appressed, and more abruptly pointed than either of the previous species of *Muhlenbergia*.

The scales of *M. mexicana* Trim., are rather short, and bend abruptly away from the rootstock. The scales of *M. sylvatica* (T. and G.), are much like those of the former species. — *W. J. Beal, Agricultural College, Mich.*

Effect of Ice Upon Trees. — In the latter part of March of the present year a heavy fall of freezing rain covered the trees of eastern Nebraska with a coating varying from one-third to one-half an inch in thickness. Every twig, every bud was encased in a thick, transparent, icy envelope, whose weight bent and broke a great number of branches from the trees. There was a notable difference in the behavior of the different trees under this weight of ice. Trees with branches standing approximately at right angles with their axes fared best, while those with more upright branches were greatly mutilated. Thus the cottonwoods (*Populus monilifera* Aiton) suffered far less than their near relative, the Lombardy poplar (*Populus dilatata* Ait.). In the former, the widely spreading branches drooped over under the weight, and often became quite pendent, or even touched the ground without breaking, while in the last species the upright branches snapped off long before they reached a position sufficiently pendent to be stable. In the Cottonwood the branches had to bend through an arc of almost 90°, while in the Lombardy poplar the arc was increased to fully 135°. As a consequence the trees of the latter species were frequently almost entirely stripped of their branches, their stems remaining as nearly bare poles. On comparing different trees of the cottonwood, it was plain that those approaching the *excurrent* type of ramification suffered least. Some trees of this type were

PLATE IV.

Fig. 1. Rootstocks of *Leersia virginica* Willd., × about 1⅓.
Fig. 2. Enlarged drawings of portions of separate rootstocks of *Leersia virginica* Willd., to show details as to the scales.
Fig. 3. Rootstocks of *Leersia oryzoides* Swartz, about ⅝ natural size.
Fig. 4. *Muhlenbergia debilis* Trin., × about 1⅓.
Fig. 5. *Muhlenbergia diffusa* Schreber, × about 1⅓.
Fig. 6. *Muhlenbergia comata* Benth., × about 1⅓.
Fig. 7. *Muhlenbergia glomerata* Trin., × about 1⅓.
Fig. 8. *Muhlenbergia willdenovii* Trin., × about 1⅓.
Fig. 9. *Muhlenbergia mexicana* Trin., × about 1⅓.

scarcely injured at all, while those with a more *deliquescent* branching suffered the loss of nearly all their branches.

Elms usually bent their branches until supported on the ground. Maples (*Acer dasycarpum* Ehrh.) acted very nearly as the Cottonwoods did, some breaking, while others withstood the strain. No hackberries (*Celtis occidentalis* L.) broke at all, their strong branches with axillary angles of nearly 90° rendering them strong enough to withstand the heaviest weight.

White pines (*Pinus strobus* L.) suffered more than the Scotch and Austrian pines, the latter having (when young) more widely divergent branches than the former. Red Cedars and Balsam Firs trailed their lower branches upon the ground, while those above hung and rested upon those below.

An attempt was made to estimate the weight borne by each tree, and the result showed that such ice burdens are very generally overestimated. By melting the ice from a measured length of a twig, it was easy to estimate the amount of water carried by the tree. It was found that for a fine box elder, twenty-five feet in height, and with a large rounded top fully twenty-five feet in diameter, the total weight did not exceed three hundred pounds. The calculation was carefully revised, because the result seemed too small, but it was found to be correct. The effects which are so striking are clearly due to the fact that this weight, although so small, is borne as well by the slender twigs as by the larger branches. A weight of a few ounces upon the end of a long twig produces a much greater bending than many pounds would at its base. — *Charles E. Bessey.*

ZOOLOGY.

Sponges and Cœlenterates of Australia.—Dr. R. von Lendenfeld has published a résumé of the facies of the Australian Cœlenterate fauna (*Biol. Centralbl.*, Jan. 1, 1888). Australia is especially rich in sponges, containing no less than seventy per cent. of the known species of horn-sponges, Chalinas and Desmacions. Of the two first-mentioned groups, five hundred and seventy-five species and varieties have been described from all parts of the world; and of these, no less than four hundred and fourteen have been recognized in Australian waters. At least forty or fifty per cent. of the horn-sponges of any other region may be found in Australia; and this is not limited by distance or any other barrier. But the Australian horn-sponge fauna is most nearly related to those of Atlantic North America and of East Africa, the fauna of the Northern Indian Ocean differing more from that of Australia than does that of our own coast. Dr. von Lendenfeld regards the Monoxonous Tethyoid sponges as derivations of the Tetraxonia,